

Nitrogen fertilization for the management of powdery mildew of barley caused by *Blumeria graminis f. sp. hordei*

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Abstract

Powdery mildew caused by *Blumeria graminis* is one of the most widespread diseases in the world, especially in countries with humid and temperate climates. It is a major constraint for barley cultivation. In a strip block design, a greenhouse experiment was conducted in different contrasting environments during the growing seasons of 2019-2020 and 2020-2021. The study investigated the effect of nitrogen fertilization to manage powdery mildew in four Moroccan barley cultivars with different resistance levels: Taffa, Oussama, Rabat 071, and Amalou. Disease severity was assessed weekly as a percentage of the covered leaf area compared to the healthy one to calculate the area under the disease progress curve (AUDPC). Additionally, two agronomic parameters; grain yield and total dry weight were also obtained. Analysis of variance revealed significant environment, genotype, treatment, and their interaction effects on the AUDPC of powdery mildew. The data showed that the application of nitrogen fertilization; N 21%, N33% and N46%, led to a significant increase in susceptibility to disease compared to non-fertilization. Environments 1 and 2 were more significantly involved in disease severity than environments 3 and 4, and AUDPCs were increased when humid conditions were associated with N21% and N33% supply. This held true for two cultivars, Oussama and Rabat 071, which differed in their susceptibility to the disease. However, the Amalou variety was moderately affected compared to Taffa, which is resistant to powdery mildew disease. Additionally, applying nitrogen supply increases yield under favorable pathogen growth conditions but decreases it under unfavorable conditions. Despite contrasting environmental conditions, these results demonstrate that the effect of nitrogen fertilization on disease management depends on the level of pathogen attacks, the forms of nitrogen fertilizers used, and the growing conditions of both the plant and the pathogen.

Key words: Powdery mildew; Barley; Nitrogen fertilization; Disease severity; AUDPC.